WYOMING ALTERNATIVE SCHOOLS STUDENT CLIMATE SURVEY PILOT RESULTS

By
Michael Flicek, EdD
Consultant to WDE
Christopher Gwerder, MA
WDE Statistician

(Draft, November 17, 2016)

A Technical Advisory Group (TAG) was established by the Wyoming legislature in 2015. The work of the TAG was facilitated by staff from the National Center for Assessment (NCIEA). This group produced a report during the 2015 legislative interim and a second report during the 2016 interim. The 2016 report provided guidance on the development of a pilot accountability model to be implemented during the 2016-2017 academic year. One part of that pilot involves the administration of a student climate survey once in the fall and once in the spring. Ambitious participation rate goals were established. The goal was for 95% participation for all students attending a school. The participation rate calculations will be based upon student enrollment data which will not be available until late spring or early summer. While 95% participation was likely not achieved statewide, preliminary information suggests that participation was quite high for a survey study. This paper provides suggestions for survey scoring and interpretation based upon analyses of the initial fall administration of the survey which was completed in October.

The survey was developed by the TAG using information from a variety of sources. Alternative schools often serve students with a history of low success in school and focus on the task of keeping these students engaged in and attending school. With this in mind, items were developed/selected for the survey that measured the relationship constructs of respect and support. There was one item that addressed trust which is an aspect of support. Other items were included to address academic rigor. To get at student perceptions of rigor, items were developed/selected that addressed high expectations. The dimensions of respect, support, and high expectations are the conceptual dimensions that guided the development of content for the survey.

Scoring survey results may involve computing a total score on the survey. Often, however, subscale scores are computed as well. One way to organize items for subscales is to base them upon the a priori conceptual dimensions used in the survey's development. Another approach is to determine if empirical dimensions can be identified that are different in any important way from the conceptual dimensions. This investigation used exploratory factor analysis to determine if empirical dimensions could be identified based upon student responses to the survey.

An additional purpose of this investigation was to determine if school scores on the survey had enough variance for meaningfully differentiate among Wyoming alternative schools. To address these questions the responses of 922 alternative high school students from the first fall administration of the survey were used. There were 6 students who indicated that their responses were not accurate reflections of their true views. These student's responses were excluded from the sample.

Some details of the technical findings are presented as Tables 5 and 6 and Figure 1 in the Appendix. The main purpose of this report was to inform decisions about how to report survey results to schools in the most meaningful way for supporting improvement efforts.

Results

Evidence for Empirical Dimensions

Principal components analysis was performed initially. The results suggested that a three factor solution fit the data well, given that it explains a majority of the variance and adding additional components yields little improvement (see Table 5 and Figure 1 in the Appendix). Factor Analysis, using an oblique rotation, then yielded three empirical dimensions. These three dimensions explained 53% of the variance in student responses (see Table 6 in the Appendix). The survey items, their conceptual dimensions, the factor loadings and the three empirical dimensions identified by this study are presented in Table 1.

Table 1. Factor Loadings for a Three Factor Solution.

Item Number	**Text**	**Conceptual Dimensions**	**Empirical Dimensions***		
			Factor 1 loadings	**Factor 2 loadings**	**Factor 3 loadings**
			Staff Support/Respect	**Student Respect/Support**	**High Expectations**
1	Teachers at this school believe I can perform well on challenging academic work.	Support	***0.41***	-0.03	0.22
2	Teachers at this school set high standards for academic performance.	High Expectations	-0.03	0.07	***0.62***
3	I trust the staff at this school.	Support/Trust	***0.69***	0.11	-0.07
4	Students have to work hard to do well at this school.	High Expectations	-0.14	0.16	***0.53***
5	Students at this school help each other even if they are not friends.	Support	0.13	***0.61***	0.05
6	Students at this school treat property with respect.	Respect	0.04	***0.73***	0.03
7	Teachers at this school do not let students give up when the work gets hard.	Support	***0.53***	0.19	0.07
8	There is at least one staff member at this school who knows me well and shows interest in my education and future.	Support	***0.59***	-0.14	0.11
9	Staff work hard to make sure that students stay in school.	Support	***0.55***	0.15	0.12
10	Students at this school treat staff with respect.	Respect	-0.04	***0.78***	0.03
11	Students at this school treat each other with respect.	Respect	0.01	***0.84***	-0.03

12	Students at this school are treated with respect by staff.	Respect	***0.85***	0.06	-0.12
13	Teachers give me helpful suggestions about how I can improve my work in class.	Support	***0.68***	0.00	0.10
14	Teachers at this school expect students to do their best all of the time.	High Expectations	0.11	0.01	***0.64***
15	Teachers at this school have high expectations for me.	High Expectations	0.13	-0.04	***0.70***
16	Staff at this school treat me with respect	Respect	***0.88***	-0.06	-0.04
17	Staff at this school help students when they need it.	Support	***0.77***	0.03	0.06
18	Staff at this school make sure that I am planning for life after high school.	Support	***0.54***	0.01	0.20
19	Staff at this school treat each other with respect.	Respect	***0.60***	-0.01	0.17
20	Teachers explain things in a different way if students don't understand something.	Support	***0.73***	0.04	0.02

*The factor loadings for each column that are bold and italicized indicate the corresponding item belongs on that empirical dimension.

First, the 4 rigor items on the conceptual dimension for *High Expectations* also loaded on an empirical dimension. This empirical dimension, labeled Factor 3 in Table 1, accounted for 20% of the explained variance (see Table 6 in the Appendix).

The additional 2 empirical dimensions differ from the 2 conceptual dimensions in some important ways. When items based upon the conceptual dimensions were developed it was assumed that the dimensions of respect and support within a school would be evident in both staff and student behaviors. As such, no distinction was made between whether staff or student items addressed the construct. Furthermore, it was assumed that respect and support would fall along different dimensions. The empirical dimensions, however, tell a different story. First, and perhaps most importantly, the empirical dimensions suggest that perceptions of student behavior is on a separate dimension from perceptions of staff behavior. As such an empirical dimension labeled *Student Respect/Support* was identified. The dimension contains 3 items related to perceptions of student respect at a school and the remaining 1 item is related to perceptions of student's support of one another. This dimension, labeled Factor 2 in Table 1, accounted for 24% of the explained variance.

The remaining empirical dimension, factor 1, contains items to measure student perceptions of staff support and respect. This dimension contains 12 items and accounted for 55% of the explained variance. The finding that both support items and respect items loaded on the same factor suggests that student perceptions of these two conceptually different dimensions were strongly related. It is not particularly surprising that staff that are seen as respectful are also seen as supportive. It makes sense to treat these items as one dimension for the purpose of scoring and reporting. Thus, this study identified three

empirical dimensions that are labeled here as (1) *Staff Support/Respect*, (2) *Student Respect/Support*, and (3) *High Expectations*.

Scores for each student were computed on each of the three empirically identified dimensions. Items were scored as 1 for "strongly disagree", 2 for "disagree", 3 for "agree" and 4 for "strongly agree". For the purpose of this study student scores were computed on each of the three empirical dimensions. The student scores were the mean of the dimension's item scores. Table 2 presents the Pearson correlation coefficients for the student scores on the 3 empirical dimensions. The coefficients in Table 2 are about what would be expected in that they show the empirical dimensions are somewhat different but they were related to a larger school climate construct.

Table 2. Pearson Correlation Coefficients for the Empirical Dimensions.

	Student Respect/Support	High Expectations
Staff Support/Respect	0.54	0.65
Student Respect/Support		0.36

Evidence for Meaningful Differentiation

A prominent feature in the federal every student succeeds act (ESSA) is the stipulation that school accountability indicators must be able to meaningfully differentiate among schools. If all schools being measured do universally well or universally poorly on an indicator that particular indicator does not add much value to the school accountability model. The ability of school scores on the empirical dimensions from this survey to meaningfully differentiate among the alternative schools was therefore of interest.

The school scores studied here were the mean scores of all students attending the school on each of the three empirical dimensions. Mean scores and standard deviations were also computed for the entire sample of alternative high school students in Wyoming. Cohen's *d* effect sizes were computed by subtracting the school mean from the state mean and dividing by the state standard deviation. These effect sizes indicate how far the school's mean is above or below the state mean expressed as a percentage of the state standard deviation. The state alternative high school mean and standard deviation are presented in Table 3.

Table 3. Statewide Mean and Standard Deviation for Sample of Wyoming Students Who Completed the Student Climate Survey in the October, 2016.

	Mean	Standard Deviation
Staff Support/Respect	3.32	0.49
Student Respect/Support	2.80	0.67
High Expectations	3.23	0.46

Collectively the mean score on Staff Support/Respect was the highest and the Student Respect/Support mean score was the lowest. The mean for High Expectations fell between the other two means but it was closer to Staff Support/Respect than to Student Respect/Support. These findings are reasonable in

that both Staff Support/Respect and High Expectations involve perceptions of teacher actions and Student Respect/Support reflect perceptions of student actions.

The school means and effect sizes on each of the three empirical dimensions are presented in Table 4. From Table 4 we see that the school effect sizes on Staff Support/Respect ranged from 83% of a standard deviation below the state mean to 82% of a standard deviation above the state mean for a total range from the lowest score to the highest score of 1.65 standard deviation units. The school effect sizes on Student Respect/Support ranged from 150% of a standard deviation below the state mean to 104% of a standard deviation above the state mean for a total range of 2.54 standard deviation units. On High Expectations the means ranged from 98% of a standard deviation below the state mean to 46% of a standard deviation above the mean for a total range of 1.44 standard deviation units. There is ample variance on these dimensions to meaningfully differentiate among the Wyoming alternative schools.

Table 4. School Means and Effect Sizes for the Three Empirical Dimensions.

	Staff Support/Respect		Student Respect/Support		High Expectations	
SCHOOL	Mean	Effect Size	Mean	Effect Size	Mean	Effect Size
One	3.60	0.56	3.04	0.36	3.31	0.18
Two	3.22	-0.21	2.63	-0.25	2.90	-0.73
Three	3.18	-0.28	2.96	0.24	3.32	0.20
Four	3.72	0.82	3.50	1.04	3.33	0.23
Five	3.22	-0.21	2.49	-0.46	3.11	-0.27
Six	3.66	0.70	3.14	0.51	3.39	0.36
Seven	2.99	-0.67	2.37	-0.64	3.10	-0.29
Eight	3.18	-0.28	2.82	0.03	3.37	0.30
Nine	2.91	-0.83	2.60	-0.30	2.78	-0.98
Ten	3.47	0.30	2.93	0.19	3.44	0.46
Eleven	3.59	0.56	2.90	0.15	3.18	-0.10
Twelve	3.45	0.26	3.06	0.39	3.25	0.04
Thirteen	3.42	0.20	2.99	0.28	3.28	0.10
Fourteen	3.35	0.06	2.59	-0.31	3.29	0.13
Fifteen	3.39	0.14	2.89	0.13	3.29	0.14
Sixteen	3.19	-0.27	2.60	-0.29	3.23	-0.01
Seventeen	2.92	-0.82	2.75	-0.07	3.00	-0.50
Eighteen	3.02	-0.60	1.79	-1.50	2.95	-0.60
Nineteen	3.37	0.10	2.91	0.17	3.32	0.19
Twenty	3.37	0.09	3.03	0.34	3.25	0.04
Twenty one	3.56	0.49	3.44	0.96	3.33	0.22
Twenty Two	3.30	-0.04	2.69	-0.17	3.23	0.01

Conclusions and Recommendations

Three empirical dimensions were identified that were substantively different from the conceptual dimensions that guided item development. First, items related to staff support and staff respect all loaded on one single dimension. This empirical Staff Support/Respect dimension has 12 items while the other two dimensions had 4 items each. More items typically results in a more reliable score and the

Staff Support/Respect is likely the most reliable of the three dimensions. Having a supportive and respectful staff is particularly important for alternative schools that are largely serving students with a history of low success in schools. An important role for alternative schools is to keep these students engaged in school and helping them graduate. A supportive and respectful environment contributes to that goal.

Second, separating perceptions of student and teacher actions related to respect and support is a substantial, but important change given the fact that student perceptions were quite different on these two dimensions. Both dimensions are actionable and gains on one or both would be compelling evidence of an improving climate in a school. More supportive and respectful students and staff improve the school's ability to focus on the student learning mission.

Third, the conceptual dimension of High Expectations was also identified as a distinct empirical dimension. The support and respect dimensions set the stage for learning to occur and the high expectations dimension provides evidence of rigor at a school. Taken together these three empirical dimensions provide important information about a school's climate that can inform school improvement decisions.

Finally, there was evidence that school scores on these dimensions had ample variance for the purpose of meaningfully differentiating among the alternative schools in Wyoming.

In light of these findings we recommend that these three empirical factors be used for scoring and reporting of survey results both for this pilot year and, in the absence of data suggesting otherwise, future operational administrations.

Table 5. Principal Component Output for 20 Student Survey Results.

	Standard deviation	Proportion of Variance	Cumulative Proportion
PC1	2.9674	0.4403	0.4403
PC2	1.3474	0.0908	0.5311
PC3	1.1323	0.0641	0.5952
PC4	0.8960	0.0401	0.6353
PC5	0.8624	0.0372	0.6725
PC6	0.8092	0.0327	0.7052
PC7	0.7906	0.0313	0.7365
PC8	0.7353	0.0270	0.7635
PC9	0.7289	0.0266	0.7901
PC10	0.7136	0.0255	0.8155
PC11	0.7102	0.0252	0.8408
PC12	0.6924	0.0240	0.8647
PC13	0.6612	0.0219	0.8866
PC14	0.6431	0.0207	0.9073
PC15	0.6226	0.0194	0.9266
PC16	0.5894	0.0174	0.9440
PC17	0.5517	0.0152	0.9592
PC18	0.5496	0.0151	0.9743
PC19	0.5293	0.0140	0.9883
PC20	0.4829	0.0117	1.0000

Table 6. Variance Explained by Three Empirical Dimensions.

	Factor 1	Factor 2	Factor 3
SS loadings	5.83	2.55	2.13
Proportion Var	0.29	0.13	0.11
Cumulative Var	0.29	0.42	0.53
Proportion Explained	0.55	0.24	0.20
Cumulative Proportion	0.55	0.80	1.00

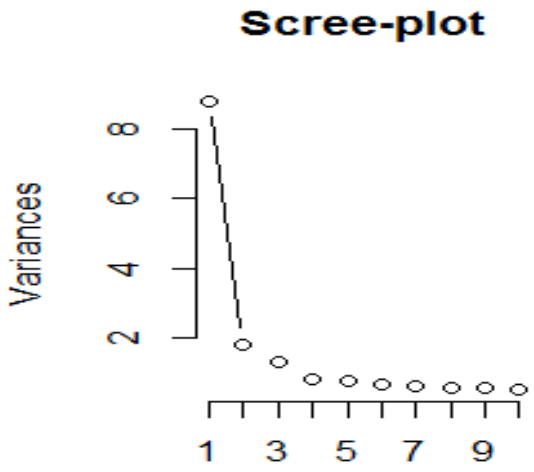

Figure 1. Scree Plot.